

A Ground Testbed to Advance US Capability in Autonomous Rendezvous and Docking

Completed Technology Project (2011 - 2013)



Project Introduction

This project will advance the Autonomous Rendezvous and Docking (AR&D) GNC system by testing it on hardware, particularly in a flight processor, with a goal of testing it in IPAS with the Waypoint L2 AR&D scenario. The entire Agency supports development of a Commodity for Autonomous Rendezvous and Docking (CARD) as outlined in the Agency-wide Community of Practice whitepaper entitled: "A Strategy for the U.S. to Develop and Maintain a Mainstream Capability for Automated/Autonomous Rendezvous and Docking in Low Earth Orbit and Beyond". The whitepaper establishes that 1) the US is in a continual state of AR&D point-designs and therefore there is no US "off-the-shelf" AR&D capability in existence today, 2) the US has fallen behind our foreign counterparts particularly in the autonomy of AR&D systems, 3) development of an AR&D commodity is a national need that would benefit NASA, our commercial partners, and DoD, and 4) an initial estimate indicates that the development of a standardized AR&D capability could save the US approximately \$60M for each AR&D project and cut each project's AR&D flight system implementation time in half.

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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Center Innovation Fund: JSC CIF

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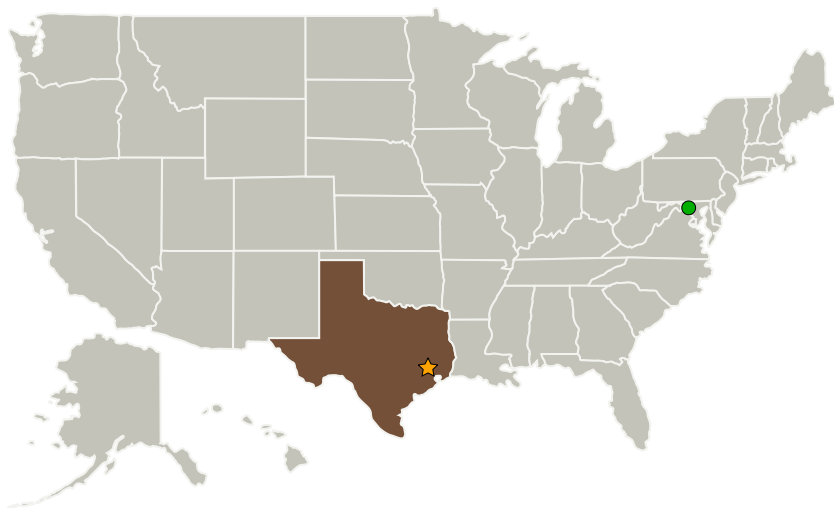


rendezvous in a weak gravity environment –either at L2 or around an asteroid. We choose to focus our IRaD effort on the AR&D algorithms and software for the Waypoint Mission, thus broadening our scope, maintaining our cutting-edge capability, and advancing US manned space exploration. Our goal is to be flexible enough to meet the needs of the NASA vision as it applies to any AR&D mission the Agency chooses to embark upon.

Anticipated Benefits

1) the US is in a continual state of AR&D point-designs and therefore there is no US “off-the-shelf” AR&D capability in existence today, 2) the US has fallen behind our foreign counterparts particularly in the autonomy of AR&D systems, 3) development of an AR&D commodity is a national need that would benefit NASA, our commercial partners, and DoD, and 4) an initial estimate indicates that the development of a standardized AR&D capability could save the US approximately \$60M for each AR&D project and cut each project’s AR&D flight system implementation time in half.

Primary U.S. Work Locations and Key Partners



Project Management

Program Director:

Michael R Lapointe

Program Manager:

Carlos H Westhelle

Project Manager:

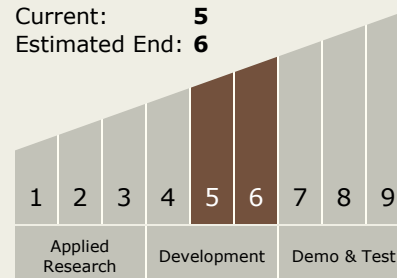
Christopher N D'souza

Principal Investigator:

Christopher N D'souza

Technology Maturity (TRL)

Start: 5
Current: 5
Estimated End: 6



Technology Areas

Primary:

- TX04 Robotic Systems
 - └ TX04.5 Autonomous Rendezvous and Docking
 - └ TX04.5.3 Rendezvous, Proximity Operations, & Capture (RPOC) Flight and Ground Systems

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Organizations Performing Work	Role	Type	Location
★ Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
● Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland
The Charles Stark Draper Laboratory, Inc.	Supporting Organization	R&D Center	Cambridge, Massachusetts

Primary U.S. Work Locations

Texas